TimeTracker

Employee Scheduling Simplified

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1. INTRODUCTION

1.1 OVERVIEW

Successfully bringing a project to completion on time and within budget and resource constraints is a universal challenge faced by most businesses. One very important aspect of managing this is ensuring that employee hours are tracked accurately. Thus allowing project progression to be monitored closely and aiding with payroll and client billing. This is where the TimeTracker application can help. TimeTracker will be a timesheet web application that will allow hours worked by the employees of a company to be tracked and monitored. This will allow management to ensure overtime is kept in check, project progress is monitored and clients are billed accurately. TimeTracker will provide a fast, easy to use mobile web application that will allow for accurate time tracking and efficient project management.

The main functionality of the application will be:

- Add new users, projects and associated companies
- Add/Edit timesheets
- View Timesheets
- Employee Leave Tracking
- Track Billable Hours
- Project Administration
- Project Monitoring Dashboard

1.2 BUSINESS CONTEXT

The idea was developed during my intra placement at Spanish Point Technologies ltd. Spanish Point Technologies are a software company that provide consulting and build services based on Microsoft technologies.

Currently employees use a SharePoint list to enter their weekly timesheet details which is the exported as an excel spreadsheet at the end of the month for analysis by the project manager and financial department. This is not an ideal situation for a number of reasons, for example if an employee does not have access to a computer entering details from a mobile device can be difficult and time consuming as SharePoint does not have strong native functionality for mobile access. This method also does not provide any feedback or project monitoring to the project manager, this means that it can be difficult to keep clients updated on the progress of a particular project or to monitor if a project is currently within time or budget constraints.

While the idea was developed in conjunction with the company it will not be tailored to or constrained by their current systems. Therefore the finished application will be applicable to a wide range of companies and projects.

1.3 GLOSSARY

. NET - The .NET framework is a development framework from Microsoft that provides a Controlled environment where software can be developed, installed and executed on Windows based operation Systems.

ASP.NET – Is an open source server-side web application framework for web development, developed by Microsoft.

ASP.NET Identity – Membership system for ASP.NET applications.

Entity Framework – Is an open source object relational mapping framework for ADO.NET part of the .NET framework.

ORM – Object Relational Mapping

2 GENERAL DESCRIPTION

2.1 PRODUCT / SYSTEM FUNCTIONS

TimeTracker will be a cloud hosted platform independent web application. It will have a simple intuitive user interface to allow users to get up and running with the application without any training.

The system will allow an administrative user to create an account for the company. This user will then be responsible for adding new users, companies and projects to the application. They will be provided with an administration area/screen that will provide them with the various options available to them. When a new employee needs to be added to the system the administrator will set up an account for them by adding all required details and an invite email will be sent to the new user. This email will contain the users sign in details.

When a user wants to access the system they will be brought to a sign in page, from here they will enter their sign in credentials and these will be validated by the system. If the credentials are correct the user will be brought to the home page. If the credentials are incorrect the user will be notified by an alert and given an opportunity to reenter their details or request a password reset.

The home page will present the user with the opportunity to add a new timesheet or search for an existing timesheet. If they choose to add a new timesheet they will be brought to a new page that will provide them with a blank timesheet that will default to the current user and current week. The user can then change the week but only an administrator can enter a timesheet for another user so the option to select another user will be disabled for normal users. When they have entered the timesheet information the user can then choose to save or cancel the timesheet. If save is chosen the system will be updated and the user will be brought to the view screen where the will see the newly created timesheet. If cancel is chosen they will be brought back to the home screen.

If a user chooses to search for an existing timesheet they will be given a number of filters to apply. Once the user clicks on the search button the system will search the database and return all results that match the criteria. These results will be displayed on screen for the user and they will be presented with the option to edit, view or delete them. The delete and edit options will only be available for results that match the currently logged in user unless they are an administrator.

The delete option will allow a user to delete a timesheet from within the current month, it will not allow timesheets before this to be deleted by the average user as this may affect payroll or customer billing. Only an administrator will be allowed to delete timesheets outside of the current month. This will also apply to editing of timesheets.

It is hoped that an additional dashboard area will be provided for the project and finance managers. These two user groups will also have administrator access to the system. This area will provide visualization of statistics gathered from the time sheeting process, such as, hours worked per project, monthly billable and non-billable hours, employee utilization and project progression/completion.

2.2 USER CHARACTERISTICS AND OBJECTIVES

Although TimeTracker is intended for use within a software development company it will be applicable to any company that requires tracking of employees working hours. It will be a platform independent web application and as such will not require staff to have any special expertise or previous experience with similar applications.

These days not all members of staff work in a companies office, employees may work from home, a clients office or even overseas. These factors can make it difficult to track employees working hours and time spent on specific projects using traditional methods. Time Tracker is intended to make this process easier and more streamlined for employees, managers and business owners by providing a simple and intuitive web application that will facilitate the time sheeting process. Four unique user groups have been identified.

AVERAGE USER

The average user is expected to be quite experienced when it comes to technology. They may not always be located in office or near a computer so the application will need to be responsive to mobile devices. The interface should be simple and intuitive to allow the user to quickly and efficiently complete the task. The main functions this user requires are:

- Add a new timesheet
- Delete a timesheet
- Edit a timesheet
- View a timesheet

PROJECT MANAGER

The project manager will require some extra functionality from the system. While they will use the system in the same way as the average user but they will also need to be able to search for all timesheets that are related to a specific project. It would also be extremely beneficial if they could view and monitor the progress of projects on a visualization dashboard. From the dashboard they could view the statistics on a specific project. This would allow them to monitor the project and perhaps provide estimation for future projects. The additional functions this user requires are:

- Search function
- Annual leave section
- Dashboard

ADMINISTRATOR

The overall system will require an administrator user who will manage employees and projects. Employees will not be allowed to register with the application themselves but will be added by the administrator when they start work with the company. Users will then be sent an email with the login details. When a new project is acquired an administrator will enter it into the system. The main functions this user requires are:

- Administration Area
- Add/Delete an employee
- Add a project
- Add a company

FINANCE

The finance department will use the timesheets at the end of the month to calculate payroll for the month and to bill clients for time spent on projects. The main functions this user requires are:

- Check hours worked within limit
- Allow filtering by customer project for customer billing
- Ability to monitor annual leave
- Dashboard

2.3 OPERATIONAL SCENARIOS

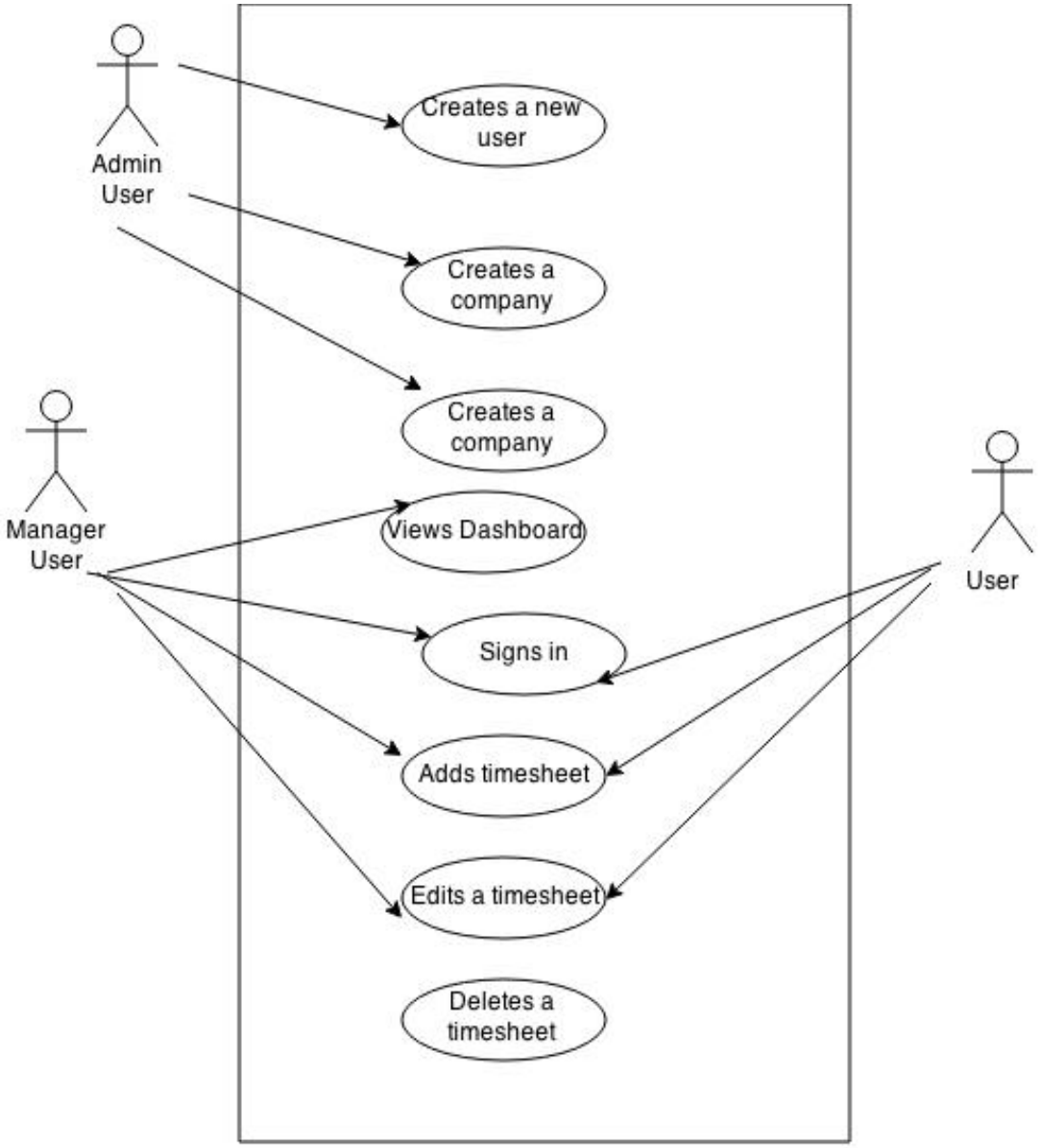
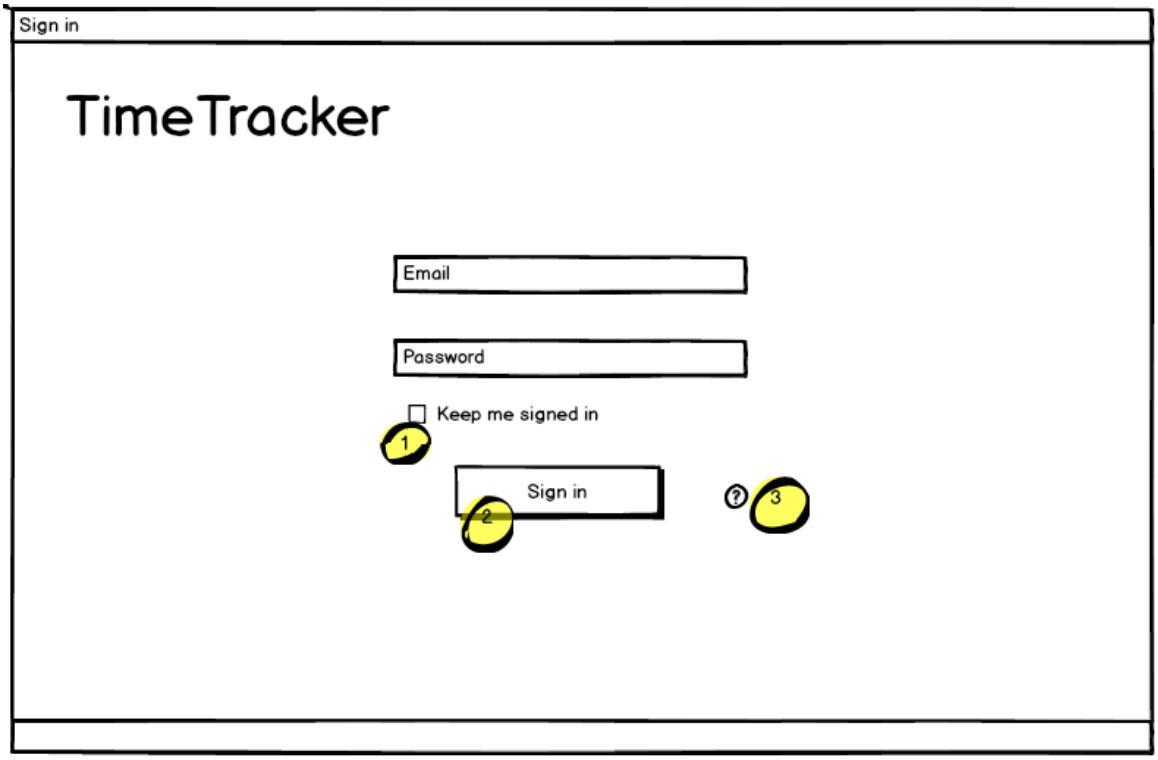


Figure 1 Overall System Use Case

2.3.1 USER SIGNS IN TO TIMETRACKER

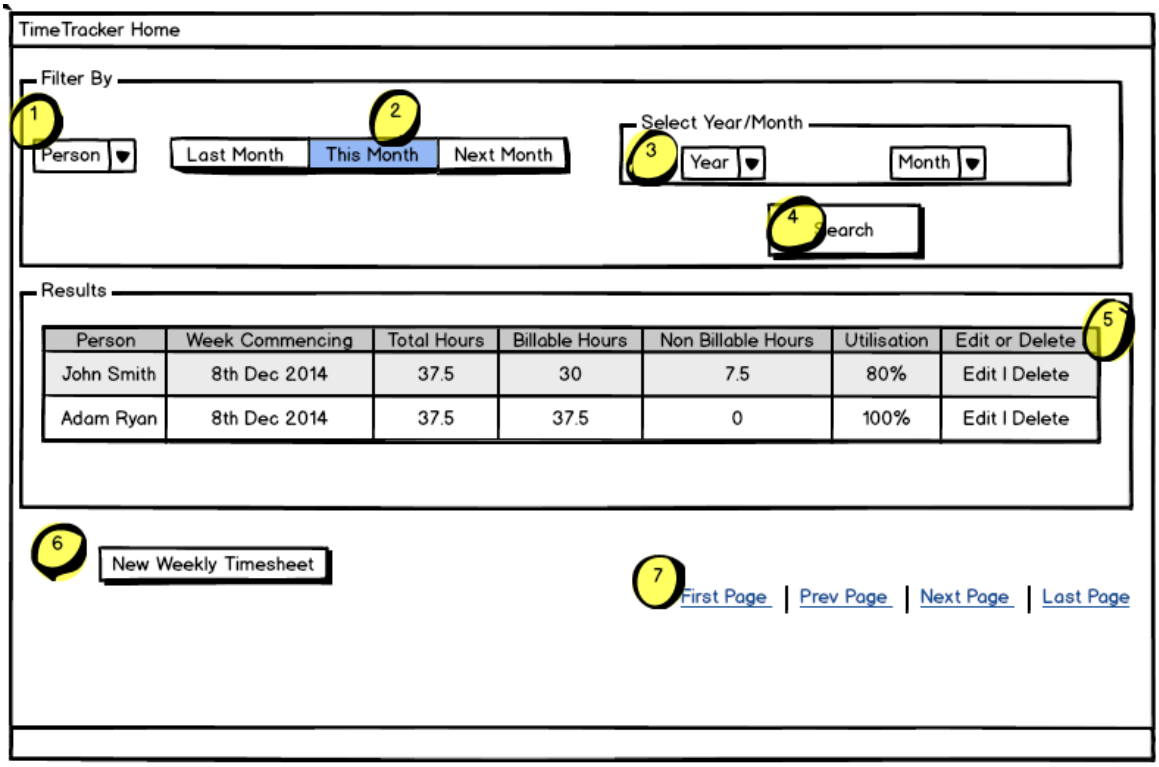
When the administrator creates a new user they will receive an email with their sign in credentials. The email will also contain a link to the application that will bring the user to the sign in page. On this page the user will be presented with fields to enter their email and password and a checkbox to allow them to stay logged in to the system for a period of time. It is not currently specified how long this period will be. There will also be a help button in case a user has forgotten their user name or password. Once the user clicks the sign in button the users credentials will be validated by the system and the user will be signed in to the system and brought to the home page or they will receive an error message. The error message will provide clear information to the user on what the issue was and given instructions to rectify it.



1. Checkbox to allow users to stay signed in
2. Sign in button, when clicked user validation is performed. If successful user is brought to Home page. If unsuccessful user gets an alert.
3. Help button, required if user has forgotten password etc.

2.3.2 USER SUCCESSFULLY SIGNS IN

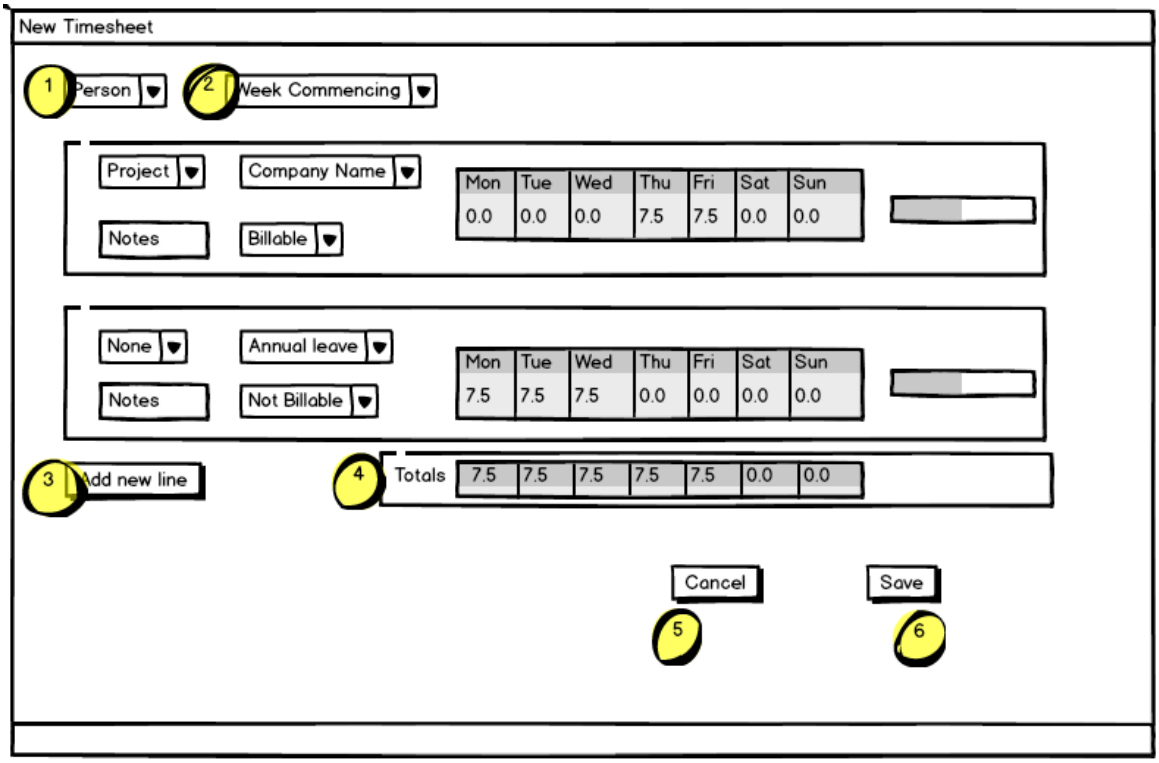
If the system validates the users credentials successfully they will be brought to the home page. This page will present the user with the option to add a new weekly timesheet or to search for an existing one.



1. Person dropdown will default to logged in user
2. Month selection will default to this month but can be changed
3. User can select month and year to filter by
4. Search button will return list of all relevant timesheets
5. Search results
6. Button to allow user to add a new timesheet
7. Allows user to easily browse through results

2.3.3 USER SELECTS ADD NEW WEEKLY TIMESHEET

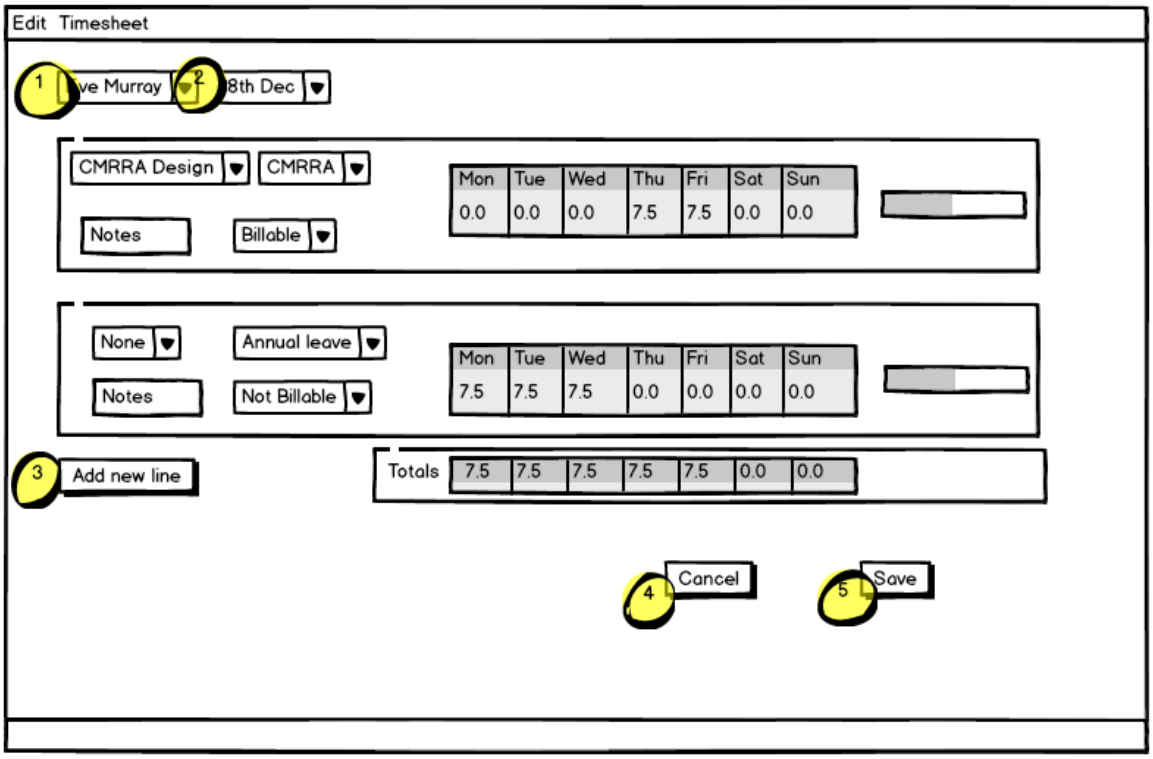
If the user selects add a new weekly timesheet from the home page they will be brought to a new timesheet. This will allow them to create a new weekly timesheet. If the user has administration access they will be allowed to choose another user to create the timesheet for, if not they will only be allowed to create a timesheet for themselves. They can then select the week they wish to enter details for. The timesheet will initially consist of two rows; one for regular work hours and one for leave hours. There will be a button that will allow the user to add a new line if required as many employees will work on a number of projects over the course of the week. The user can then enter the project; company, whether the hours worked were billable or non-billable and any additional notes. There will be a section to fill in the hours worked per day and a progress bar will show the amount of days logged against the selected project.



1. Person will default to logged in user
2. Will default to current week
3. If user needs to add another project
4. Weeks totals across all projects/leave
5. Allows user to cancel the timesheet
6. Allows user to save timesheet

2.3.4 USERS SELECTS EDIT TIMESHEET

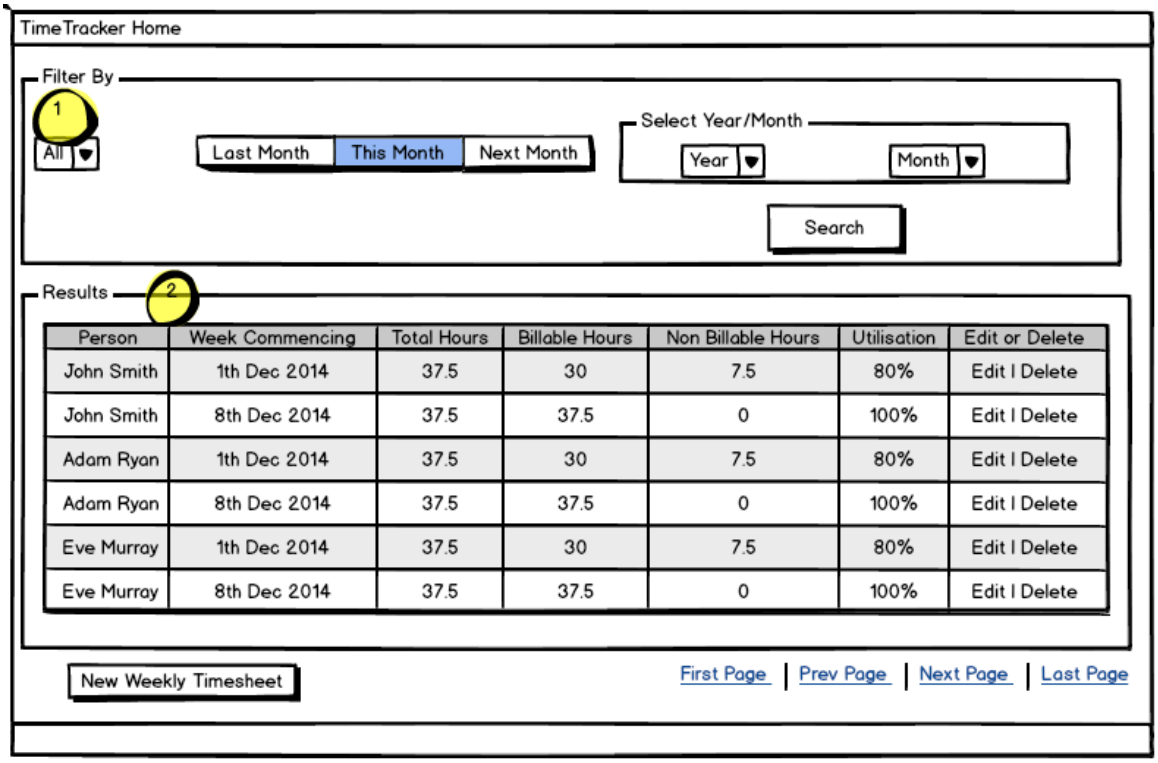
If a user chooses to edit a specific timesheet they will be presented with this screen. It will allow users to make amendments to the selected timesheet or add a new line. They can then choose to cancel or save the changes.



1. User timesheet belongs to
2. Week of timesheet
3. Allows user to add additional hours
4. Allows user to cancel changes
5. Allows user save changes

2.3.5 USER SEARCHES FOR A TIMESHEET

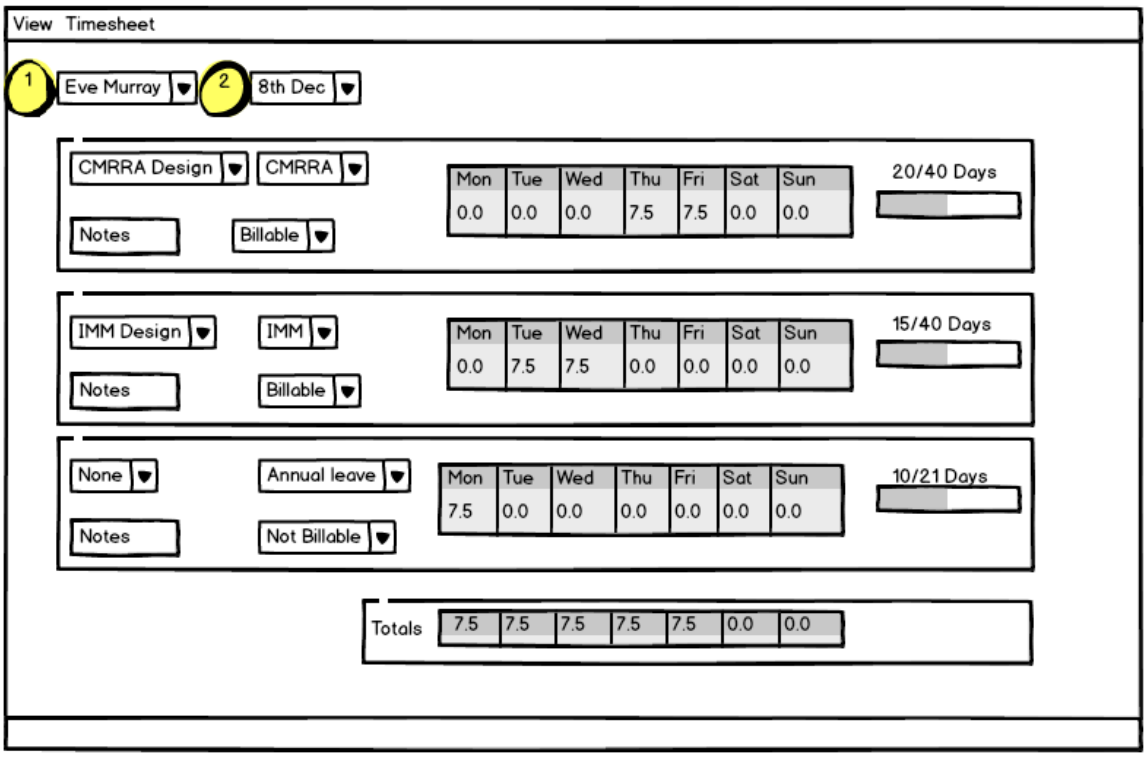
The home page will present the user with a number of options to filter a search by. They can search all employees or just a specific person. The default month will be this month but there will also be buttons for last or next month, to allow users to quickly search. If a user is looking for a specific date or month they can use the year and month drop down boxes. Timesheets that match the search will be displayed in a list in the results section.



1. Person choice set to all
2. Results matching criteria are returned

2.3.6 USER VIEWS TIMESHEET

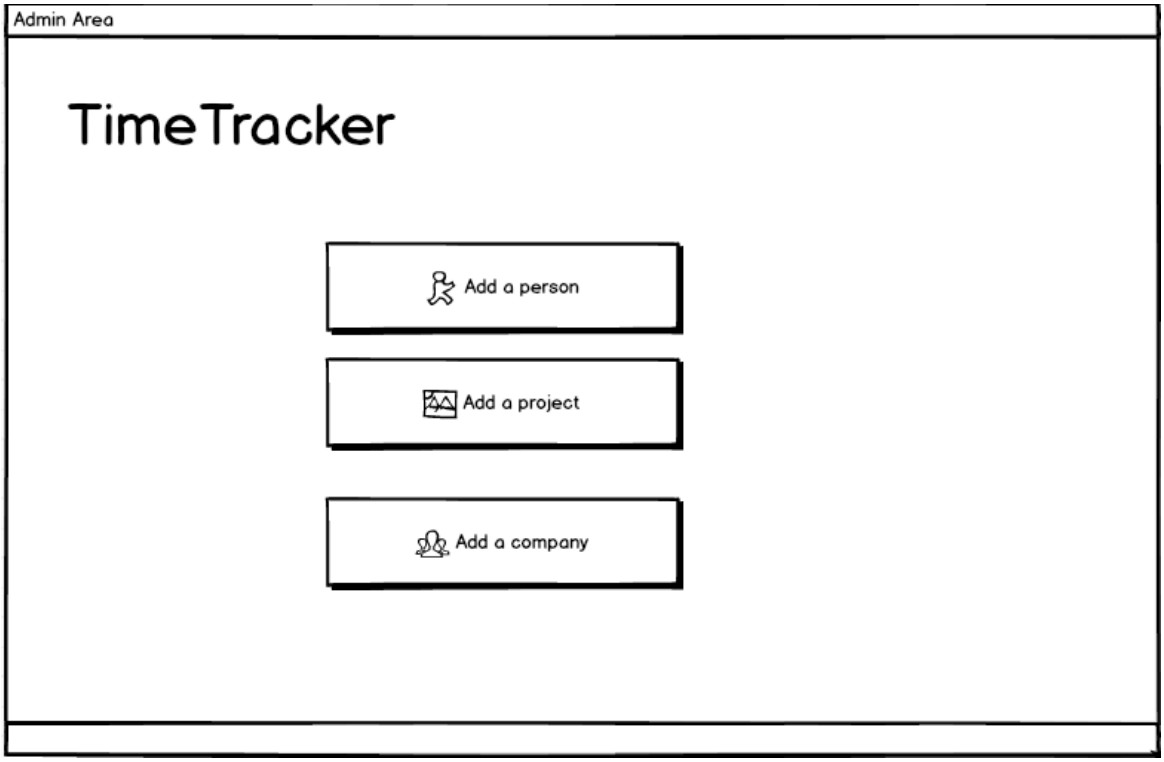
If a user selects to view a timesheet they will be shown the full weekly timesheet and there will be a button to close the timesheet and return to the previous screen.



1. User that was selected
2. Week that was selected

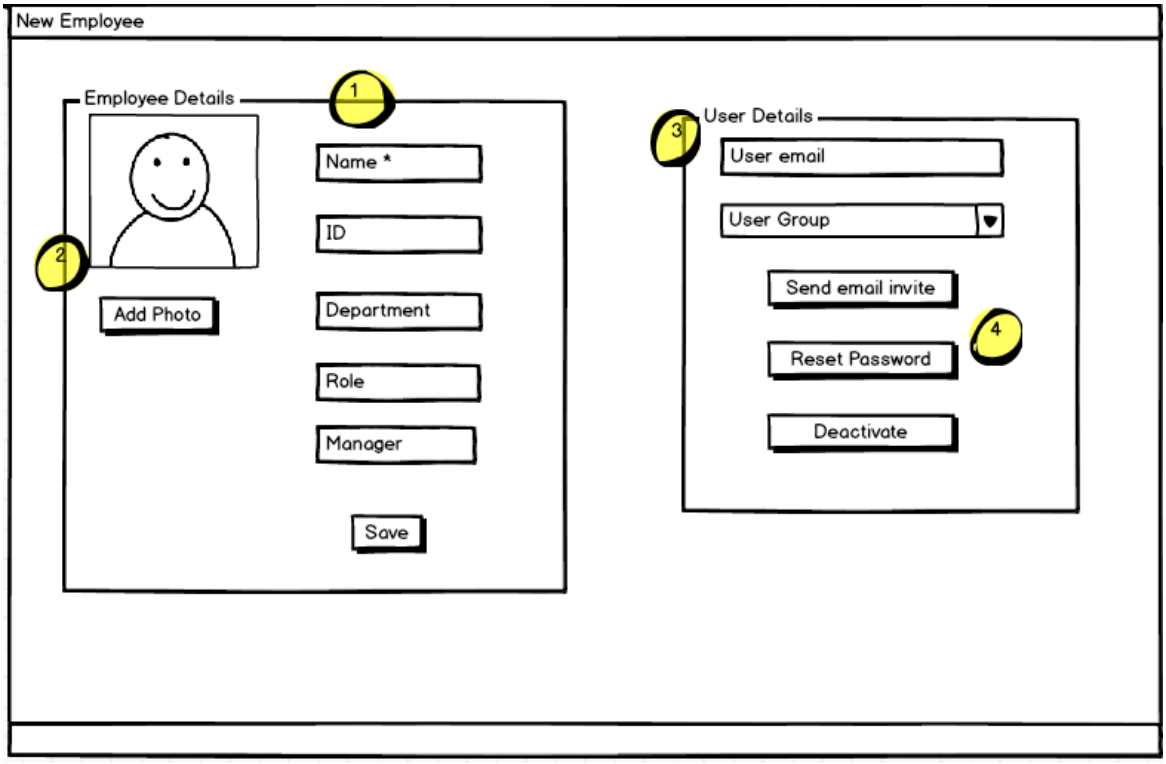
2.3.7 ADMINISTRATION AREA

The application must have at least one administrator but the system will allow for other to be given administrator rights such as project or finance managers. The administration area will provide three options, to add a new person, add a new project or add a new company. Add anew person will allow for adding a new employee and will bring the user to that screen, and the same applies to the other buttons.



2.3.8 CREATE A NEW USER

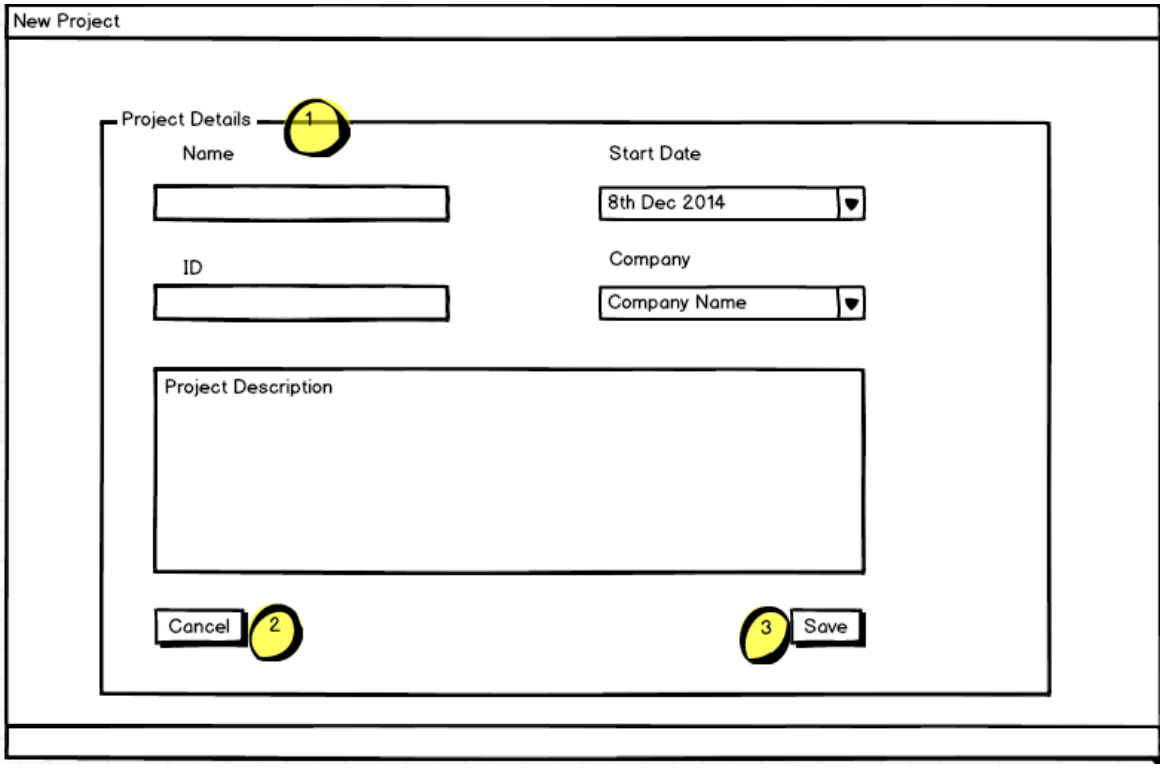
This screen allows an administrator to create a new employee in the system. They will enter the employee details that relate to the company such as name, id, role and department. The user details will pertain specifically to the user in the system, this will contain details such as user name and user group EG: developer.



1. Employee details- details of the persons employment
2. Option to add a photo
3. User Details- details of the user in the system
4. Buttons to send invite email, reset users password or deactivate the users account

2.3.9 CREATE NEW PROJECT

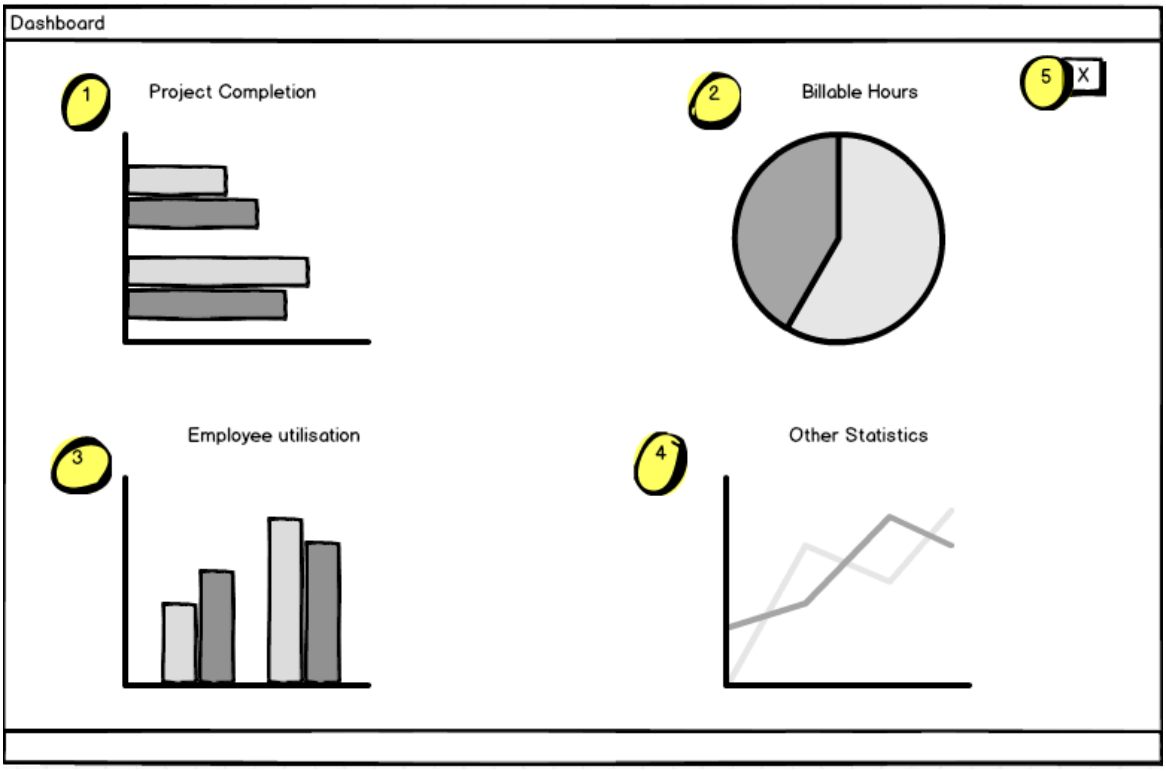
An administrator can also add a project or a company to the system. Below is the screen for adding a project but the screen for adding a company will be similar.



1. Project Details such as name, id and company involved.
2. Cancel button
3. Save button

2.3.10 USER VIEWS DASHBOARD

Administrators will have access to a dashboard that will allow for visualization of he data gathered by the timesheet process. Below is just a generic example at this stage of the project it is not known exactly what statistics will be gathered and analyzed for this section.



1. Project completion could be one section to show the completion rate of current projects
2. Chart visualizing billable/non billable hours
3. Employee utilization figures
4. Other statistics to be decided
5. Close dashboard button

2.4 CONSTRAINTS

This project is a final year project for B.Sc. in Computer Applications and as such is constrained by a strict timeline. Final documentation is to be submitted by the 24th of April 2015 and the finished

It is a platform independent web application and therefore it is important that it is responsive to different browsers and devices. Due to restricted resources it may be difficult to test the application on every available device and browser combination.

3 FUNCTIONAL REQUIREMENTS

3.1 ALLOW USER TO SIGN IN TO SYSTEM

Number:	**1**
Description:	Allow user to sign in to system
Criticality:	High
Technical Issues:	This will require authentication of the users credentials
Dependencies:	This will depend on the functions to create and store a new user

3.2 ALLOW USER TO CREATE A NEW TIMESHEET

Number:	**2**
Description:	Allow user to create a new timesheet
Criticality:	High
Technical Issues:	This will require information to be stored in a database, so efficiency and speed will be critical. This needs to be considered in the database schema.
Dependencies:	Dependent on a company and project existing, a timesheet cannot be added without these details.

3.3 ALLOW USER TO EDIT AN EXISTING TIMESHEET

Number:	**3**
Description:	Allow user to edit an existing timesheet
Criticality:	High
Technical Issues:	This involves interacting with the database to retrieve and edit data. Efficiency and recovery need to be considered
Dependencies:	This is dependent on a timesheet existing and the search function

3.4 ALLOW USERS TO SEARCH FOR AN EXISTING TIMESHEET

Number:	**4**
Description:	Allow users to search for an existing timesheet
Criticality:	High
Technical Issues:	Will involve querying the database and displaying search results on the page. Speed of search may be an issue. How to ensure results and search time to user will need to be carefully considered to ensure usability of the system. Efficient search functionality needs to be considered in the database design
Dependencies:	Dependent on the add timesheet requirements

3.5 ALLOW ADMIN USER TO CREATE NEW EMPLOYEE

Number:	**5**
Description:	Allow admin user to create new employee
Criticality:	High
Technical Issues:	Needs to be considered in database schema. Need a check to ensure no duplication in the system.
Dependencies:	Not dependent

3.6 ALLOW ADMIN USER TO CREATE NEW PROJECT

Number:	**6**
Description:	Allow admin user to create new project
Criticality:	High
Technical Issues:	Needs to considered in database schema
Dependencies:	Dependent upon a company existing. A project cannot exist without a company

3.7 ALLOW ADMIN USER TO CREATE ADD A NEW COMPANY

Number:	**7**
Description:	Allow admin user to create add a new company
Criticality:	High
Technical Issues:	Needs to be considered in database schema. A check needs to be implemented to prevent duplication in the system.
Dependencies:	Not dependent

3.8 PROVIDE A STATISTICAL DASHBOARD

Number:	**8**
Description:	Provide a statistical dashboard
Criticality:	Medium
Technical Issues:	A method for analyzing and visualizing the data needs to be decided. Time constraints on the project may decide how much of the data can be used for statistical analysis
Dependencies:	Dependent on data collected from inputted timesheets.

4 SYSTEM ARCHITECTURE

The TimeTracker application will be developed using the ASP.NET MVC framework, which extends the powerful open source ASP.NET framework to allow for development of dynamic web applications using the model-view-controller architectural pattern. This pattern allows the application to be split into three distinct components. The model component deals with data, the view component is responsible for user interfaces and the controller component is responsible for request routing. This separation into components follows the design principle for "*separation of concerns* ", this simplifies testing and development as it allows the components to be developed and tested independently before being integrated into a robust unified system. Each component is independent of the others and therefore they are loosely coupled allowing for easier maintenance of the application.

These components will work together to interpret and respond to users request through a browser. The simplified lifecycle of a request within an MVC application is outlined below.

1. Users sends a request by entering a URL in the browser
2. This is parsed by the URL Routing Module
3. This module identifies the appropriate controller and action by parsing the URL
4. The action identified will be carried out by the appropriate controller
5. The action will create Model class using data provided
6. The action will then pass the created Model to the appropriate View
7. The View will then create the markup based on the Model passed to it and send it to the browser in the form of a HTTP response.

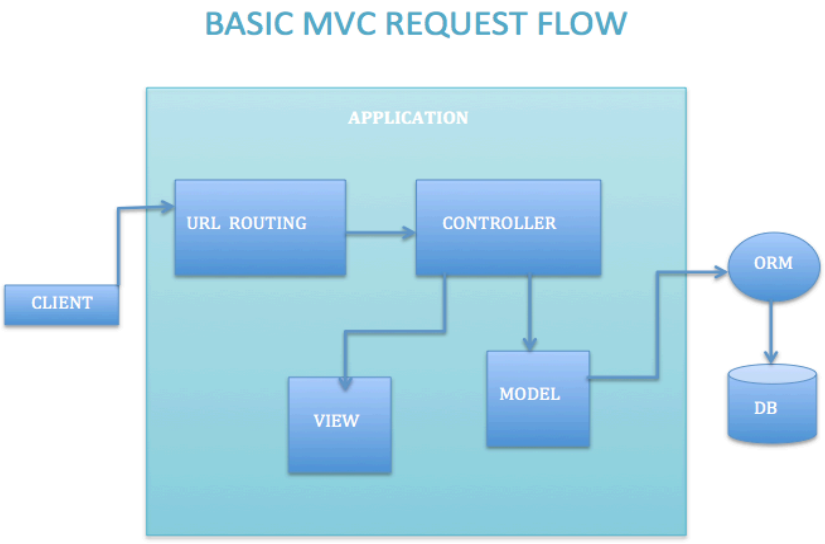


Figure 2 Basic MVC Request Lifecycle

ASP.NET Identity system will be used to manage the users of the application. ASP.NET Identity supports claims based authentication, which allows for more detailed information about the users identity and membership to be stored. It also allows for role provision in order to restrict certain aspects of the application to some users, for example the administration area. The Identity system stores user information in a database allowing for persistence control. It also provides the developer with control of the database schema meaning common tasks such as changing table names are a simple procedure.

ASP.NET MVC was designed to allow for easy testing without requiring dependencies on a web server or database and it actively encourages using a Test Driven Development approach. The MVC patterns means that the components of the application are loosely coupled and therefore can be tested in isolation. Unit testing will be performed throughout the development lifecycle, followed by integration and finally user acceptance testing.

After development and testing the TimeTracker application will be deployed using Azure. Azure is Microsoft's cloud based platform and was chosen as it allows for seamless integration with the ASP.NET framework and Visual Studio IDE making development, testing and deployment a more streamlined process.

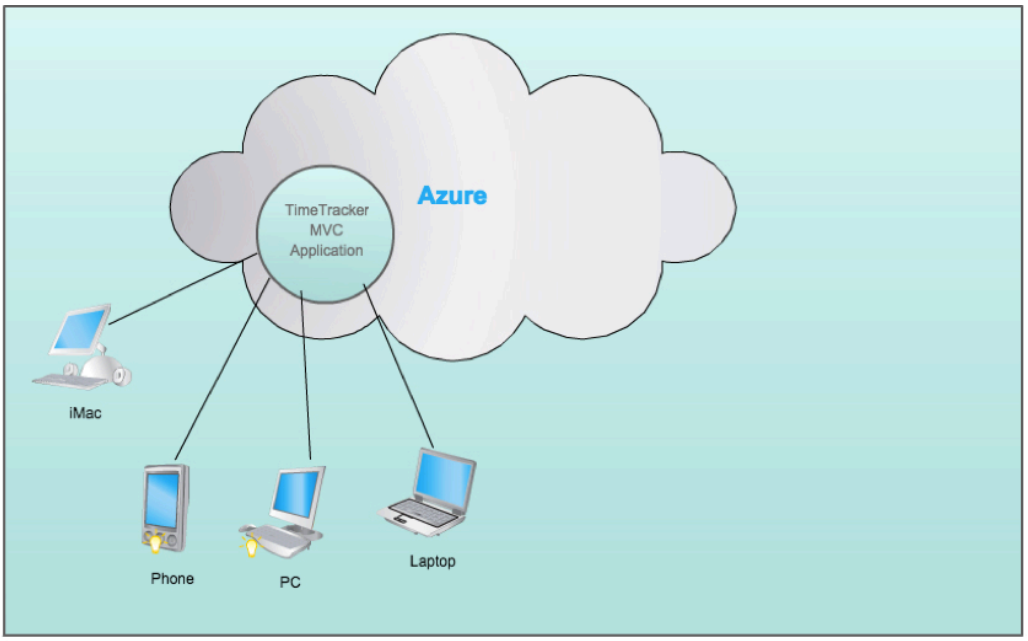


Figure 3 Application Overview

5 HIGH-LEVEL DESIGN

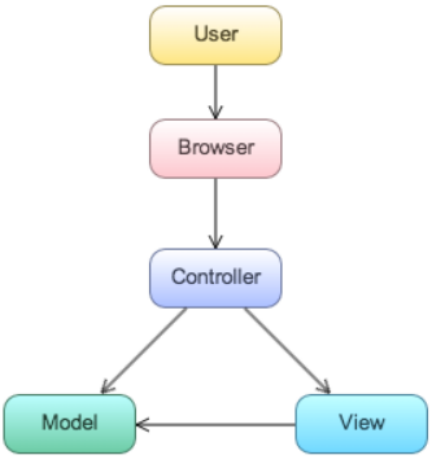


Figure 4 MVC Architectural Patten

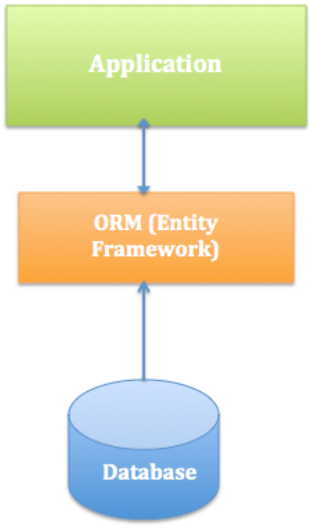


Figure 5 High Level System Overview

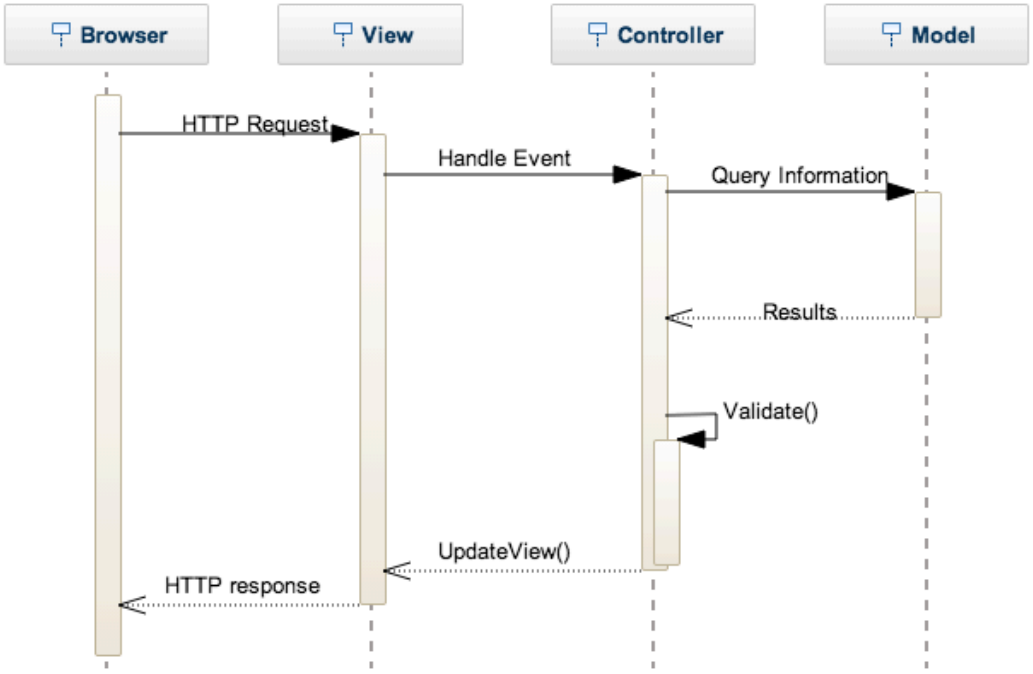


Figure 6 Sequence Diagram for MVC application

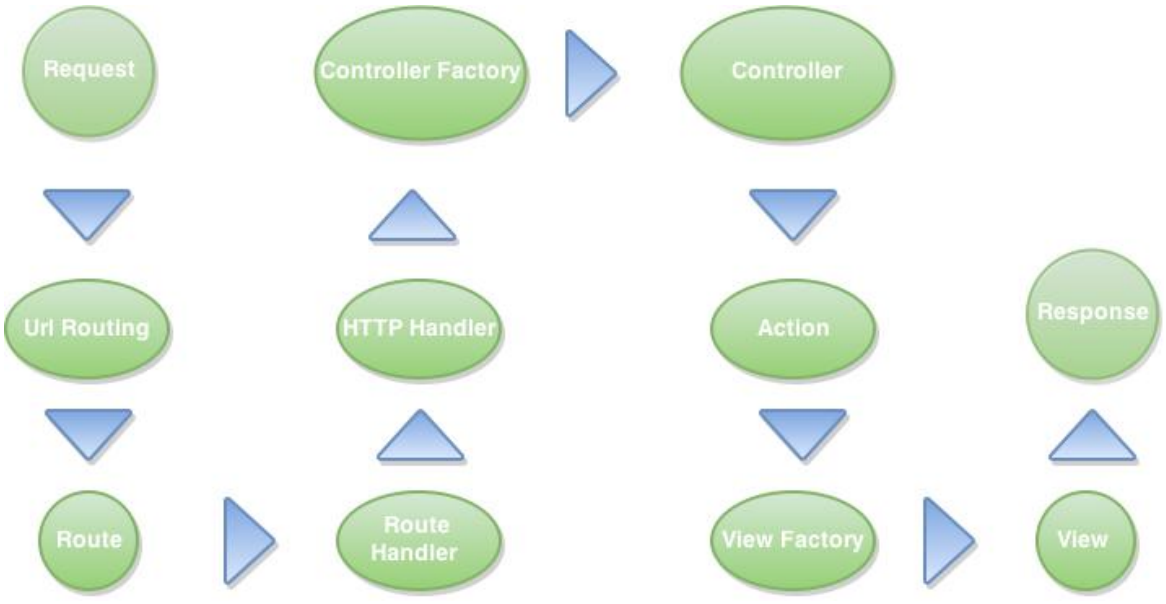
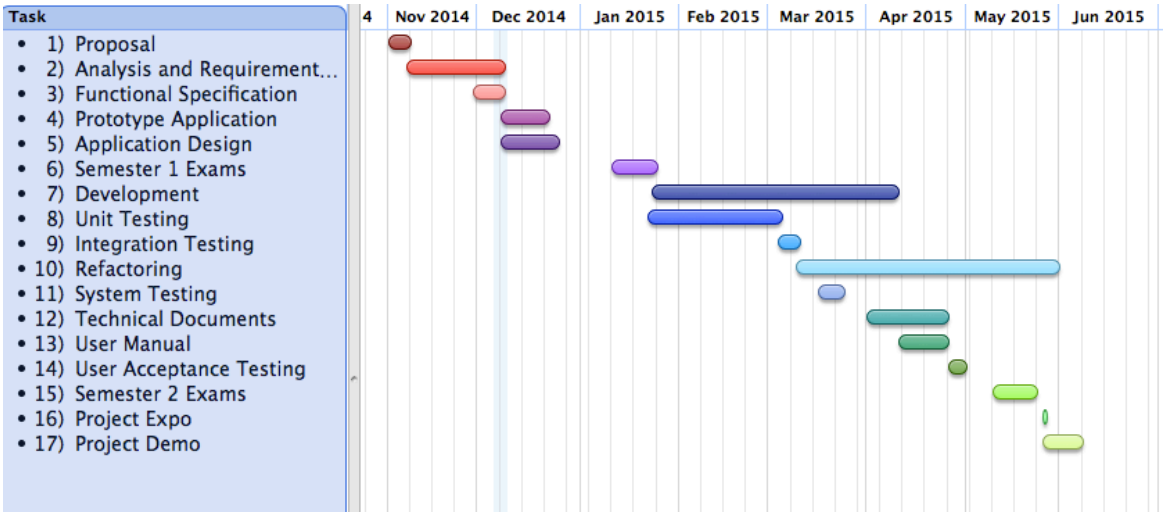


Figure 7 MVC Request Pipeline

6 PRELIMINARY SCHEDULE



7 APPENDICES

http://www.asp.net/

http://www.spanishpoint.ie/Pages/Home.aspx